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Specification and Drawings, as originally filed, with Application for Patent Serial No: **2,419,185**, on February 19, 2003, by **CANIMEX INC.**, assignee of Michel Beaudoin, Éric Nadeau, Pierre-Louis Foucault and Jean-François Lévesque, for "Cable Failure Device for Garage Doors and the Like".

Agent certificateur/Certifying Officer

March 1, 2004

Date

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CABLE FAILURE DEVICE FOR GARAGE DOORS AND THE LIKE

Field of the invention:

The present invention relates to a safety device for use with a cable-operated door, such as garage doors and the like. It is used to hold the garage door in position in case of a rupture of one of the cables or in case of a failure of one of the elements that hold the cables. The device ensures that the garage door does not fall all the way down and does not cause damages to property or even personal injuries to the users of such doors.

Background of the invention:

Cable-operated doors such as garage doors are well known in the art. A garage door is usually connected to an overhead counterbalancing mechanism that provides a counterbalancing force in order to decrease the force required to open the door and also facilitate its closing. The garage door is connected to the counterbalancing mechanism by means of two cables, one at the right and one at the left. The cables are usually made of steel. The lower free end of each cable is attached at the bottom of the door.

It is also known in the art that a garage door needs to have a proper counterbalancing system so that it may be easily opened and closed. The counterbalancing force is generally achieved by the usage of either one or many torsional springs. Each torsional spring is generally connected to two plugs, a first one being the "winding plug" at one end of the spring, and a second one being the "stationary plug" at the other end of the spring. The winding plug is generally in turn fixed onto the shaft while the stationary plug is generally fixed onto a fixed structure, such as a bearing plate for example. To transmit the force to the door, there are generally two drums on the shaft of the counterbalancing mechanism on which cables are installed. These cables are generally fixed on two bottom

brackets, one on each side (left and right) of the door, typically at the last panel of the sectional door.

It is also known in the art that occasionally, for one reason or the other, one of the cable brakes or one of the elements holding such cables undergoes failure, leading to the garage door falling all the way down, causing important damages to property or even serious personal injuries to the users of the doors. There have been many attempts to come up with safety devices used in the event of a failure of a cable or of an element holding the same.

Indeed, known in the art are various cable failure devices for garage doors and the like. However, these are known to be fairly bulky; unreliable; difficult to install, use, and/or maintain; expensive to manufacture and/or assemble; and generally not offering optimal safety and efficiency for stopping downward movement of a cable-operated door, such as garage doors and the like, in the event of a failure of one of the cables holding such cable-operated door or in the event of a failure of one of the elements holding the cables.

Hence, in light of the aforementioned, there is a need for an improved cable failure device which, by virtue of its design and components, would be able to overcome some of the aforementioned prior art problems.

Summary of the invention:

The object of the present invention is to provide a cable failure device which satisfies some of the above-mentioned needs and which is thus an improvement over the cable failure devices known in the prior art.

In accordance with the present invention, the above object is achieved, as will be easily understood, with a cable failure device such as the one briefly described herein and such as the one exemplified in the accompanying drawings.

According to another aspect of the invention, there is also provided a driving (or "counterbalancing") mechanism provided with the above-mentioned cable failure device.

According to yet another aspect of the invention, there is also provided the garage door provided with the above-mentioned driving (or "counterbalancing") mechanism.

According to yet another aspect of the invention, there is also provided a method for preventing a garage door from falling all the way down in the event of a failure in its driving (or "counterbalancing") mechanism.

The objects, advantages and other features of the present invention will become more apparent upon reading of the following non-restrictive description of a preferred embodiment thereof, given for the purpose of exemplification only with reference to the accompanying drawings.

Brief description of the drawings:

Figure 1 is a perspective view of a cable failure device according to a preferred embodiment of the invention, said cable failure device being shown in a rest position.

Figure 2 is another perspective view of the cable failure device of Figure 1, the cable failure device being shown now cooperating with a cable and in an operable position.

Figure 3 is another perspective view of the cable failure device of Figure 1, the cable failure device being shown now provided with a protective casing.

Figure 4 is a front plan view of what is shown in Figure 3.

Figure 5 is a perspective view of the cable failure device of Figure 3, the cable failure device being shown now in a disassembled configuration.

Detailed description of a preferred embodiment of the invention:

In the following description, the same numerical references refer to similar elements. The embodiments shown in the figures are preferred.

Moreover, although the present invention was primarily designed for use with a cable-operated door, such as a garage door for example, it may be used with other types of doors and objects and in other fields, as apparent to a person skilled in the art. For this reason, expressions such as "cable", "garage", "door", etc. used herein should not be taken as to limit the scope of the present invention and includes all other kinds of doors or items with which the present invention could be used and may be useful.

Moreover, in the context of the present invention, the expressions "driving mechanism", "controlling mechanism", "counterbalancing mechanism", and any other equivalent expression known in the art will be used interchangeably. Furthermore, the same applies for any other mutually equivalent expressions, such as "cable-operated door" and "garage door", as well as "support" and "bracket" for example, as also apparent to a person skilled in the art.

In addition, although the preferred embodiment of the present invention as illustrated in the accompanying drawings comprises various components and although the preferred embodiment of the cable failure device 1 as shown consists of certain geometrical configurations as explained and illustrated herein, not all of these components and geometries are essential to the invention and thus should not be taken in their restrictive sense, i.e. should not be taken as to limit the scope of the present invention. It is to be understood, as also apparent to a person skilled in the art, that other suitable components and cooperations thereinbetween, as well as other suitable geometrical configurations may be used for the cable failure

device 1 and corresponding parts according to the present invention, as briefly explained and inferred herein, without departing from the scope of the invention.

Broadly described, the cable failure device 1 according to the present invention, as shown in the accompanying drawings, is a safety device 1 for use with a cable-operated door, such as garage doors and the like, and it is used to hold the garage door in position in the event of a failure in the counterbalancing mechanism of the cable-operated door, such as, for example, a rupture of one of the cables 3 or a failure of one of the elements holding the cables 3. The cable failure device 1 according to the present invention is intended to ensure that the garage door will not fall all the way down and thus will not cause substantial damages to property or even serious personal injuries to users of the doors.

Referring to Figure 1, there is shown a perspective view of a cable failure device 1 according to a preferred embodiment of the invention. The device 1 preferably comprises a supporting structure 5 devised to be mounted onto the cable-operated door by means of suitable fasteners. To this effect, the supporting structure 5 preferably has corresponding holes 7 for receiving the fasteners. The supporting structure 5 preferably also includes a connection point 9 onto which an end of the cable 3 is to be connected, as better shown in Figure 2. The cable failure device 1 preferably comprises guiding means 11 for cooperating with and guiding the cable 3 of the cable-operated door onto the connection point 9 of the supporting structure 5, as also better shown in Figure 2. The guiding means 11 may be a single component or various components, and may be made separate to the supporting structure 5, as shown in the accompanying drawings, or could be made integral to the supporting structure 5, as apparent to a person skilled in the art. The cable failure device 1 preferably also comprises directional means 13, such as a roller for example, for cooperating and travelling along an adjacent fixed structure, such as a guide rail of the cable-operated door for example. The cable failure device 1 preferably also comprises a braking assembly 15 which is operatively mounted onto the supporting structure 5 and includes a brake 17 operable between a rest position and an operable position. The device preferably

also comprises tension detecting means 19, such as a lever arm for example, cooperating with the tensioned cable 3 for detecting a tension in said tensioned cable 3, and actuating means 21, such as a spring for example, operatively connected to the lever arm and in turn operatively connected to the brake. The brake 17 is preferably pivotally mounted about the shaft of the roller of the device and is intended to travel along a fixed frame along with the roller, such as a guide rail for example, and is adapted to cooperate with the guide rail when the brake 17 is triggered into an operable position.

As can be easily understood when referring to Figures 1 and 2, when the brake 17 is in the rest position, the roller of the cable failure device assembly will guide the door along the rail and the brake 17 will travel freely therealong inside the rail. When the brake 17 is triggered into the operable position by a loss of tension in the cable 3, corresponding to a failure in the counterbalancing mechanism for example, said loss of tension is detected by the lever arm, namely, the force of the actuating spring becomes greater than the force that was acted upon by the tensioned cable 3 against the lever arm, thereby causing the actuating lever arm which is preferably rigidly connected to the brake 17 to rotate the same and thus engage it inside of the rail, thereby urging the brake 17 against the rail and thus thereby preventing downward movement of the garage door, as apparent to a person skilled in the art. As can be easily understood, this combined action brakes the movement of the cable-operated door and thus impedes its free falling to the ground, thereby preventing damages and injuries.

The cable failure device 1 according to the present invention preferably comprises additional safety features. For example, as better shown in Figures 3 and 4, the cable failure safety device preferably comprises a protective casing 23 removably mountable onto the supporting structure 5 by suitable attachment means, for protecting the mechanism of the cable failure device 1 and for preventing an unskilled user from tampering with the mechanism. Moreover, as can be easily understood when referring to Figures 1 and 2, the lever arm used with the actuating means 21 of the cable failure device 1 is preferably shaped,

sized and positioned to conceal at least one of the fasteners used for mounting the cable failure device 1 onto the garage door when acted upon by the tensioned cable 3, as better shown in Figure 2, so as to prevent an unskilled user to remove the cable failure device 1 from the garage door when there is still tension in the cable 3, and thus prevent the occurrence of accidents. Indeed, the tension from the cable 3 must be removed so that the lever arm may be safely raised, as better shown in Figure 1, and thus have access to said at least one fastener.

The device shown in the accompanying figures is a "right cable" failure device 1 to be located at the bottom of the garage door, more specifically at the right-hand side thereof when viewed from the inside of the garage. A "left" cable failure device 1, that is, a left-hand side version of the cable failure device 1 shown, would simply be a mirror image of what is in the accompanying figures. Each cable failure device 1, whether right or left, is preferably devised to hold at least half of the load of the garage door and is tightly attached to its corresponding tensioned cables.

As may now be appreciated, the present invention is a substantial improvement over the prior art in that, by virtue of its design and components, the cable failure device 1 is very simple and easy to use, as well as is very simple and easy to manufacture and/or assemble, without compromising the reliability of its functions. Hence, it may now be appreciated that the present invention represents important advantages over other cable failure devices known in the prior art, in terms of performance and in terms of costs.

The present invention is also an improvement and presents several advantages over other cable failure brakes known on the prior art in that it may be used in the garage door industry, with new garage doors or existing garage doors, whether commercial or residential. Indeed, in the case of a cable failure, the present invention immediately stops the fall of the garage door and maintains it safely immobilized where it is until the necessary inspections and repairs are made. As it is evident from reading the above description, the present invention is

a cable failure device 1 used for immobilizing a cable-operated door, such as garage doors and the like, in the event of a failure of one of the cables 3 operating such cable-operated door or in the event of a failure of one of the elements holding the cables 3. In such cases, the present invention impedes free falling of the cable-operated door and prevents damages and injuries. The present invention is a more compact, more reliable, easier to use, easier to maintain, safer and more cost effective safety device than those available in the prior art. Furthermore, the present invention may be used with other kinds of doors, such as slidable truck doors, or with any other items suspended by a cable, as apparent to a person skilled in the art.

Of course, numerous modifications could be made to the above-described embodiments without departing from the scope of the invention, as apparent to a person skilled in the art.

FIGURE 1

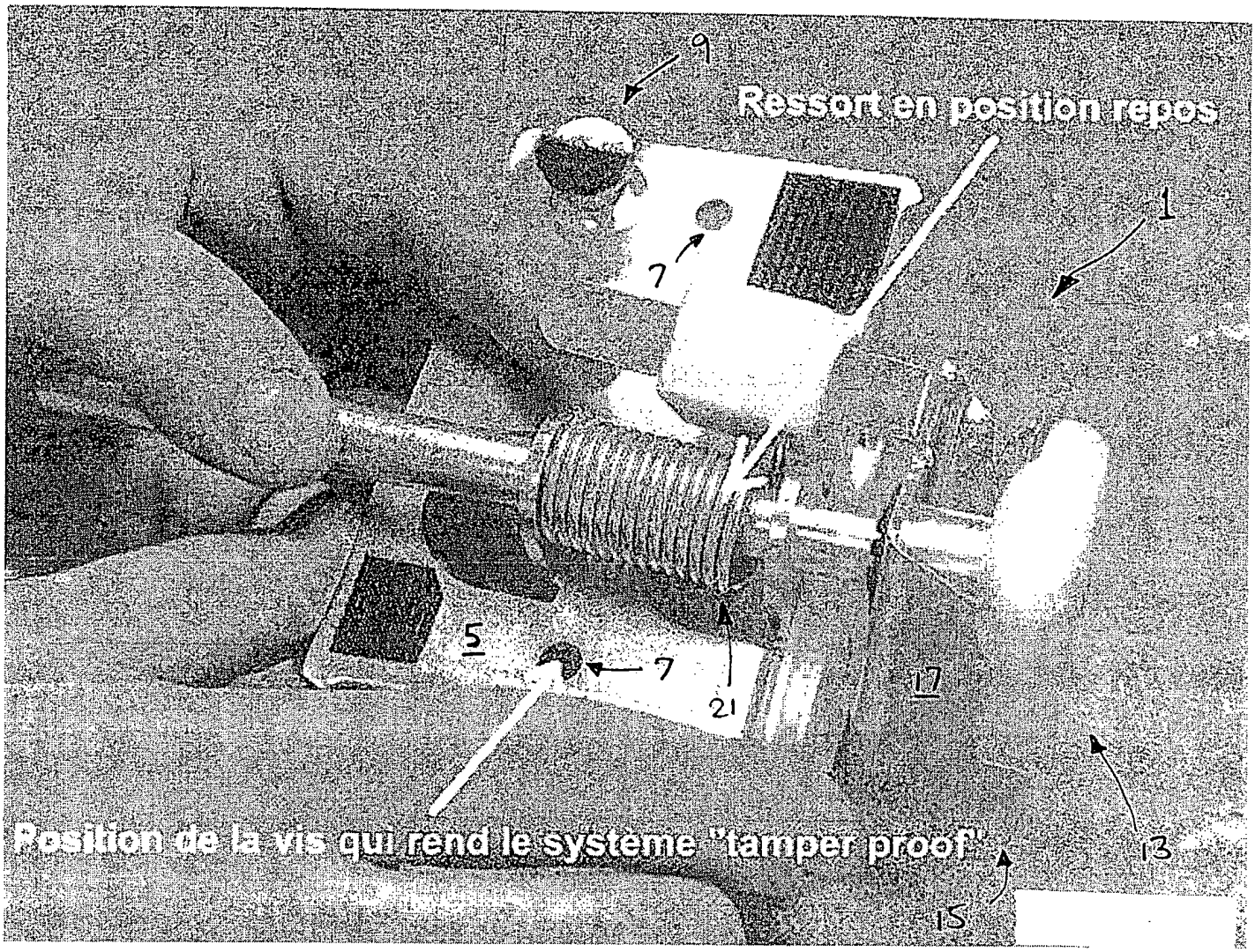

FIGURE 2

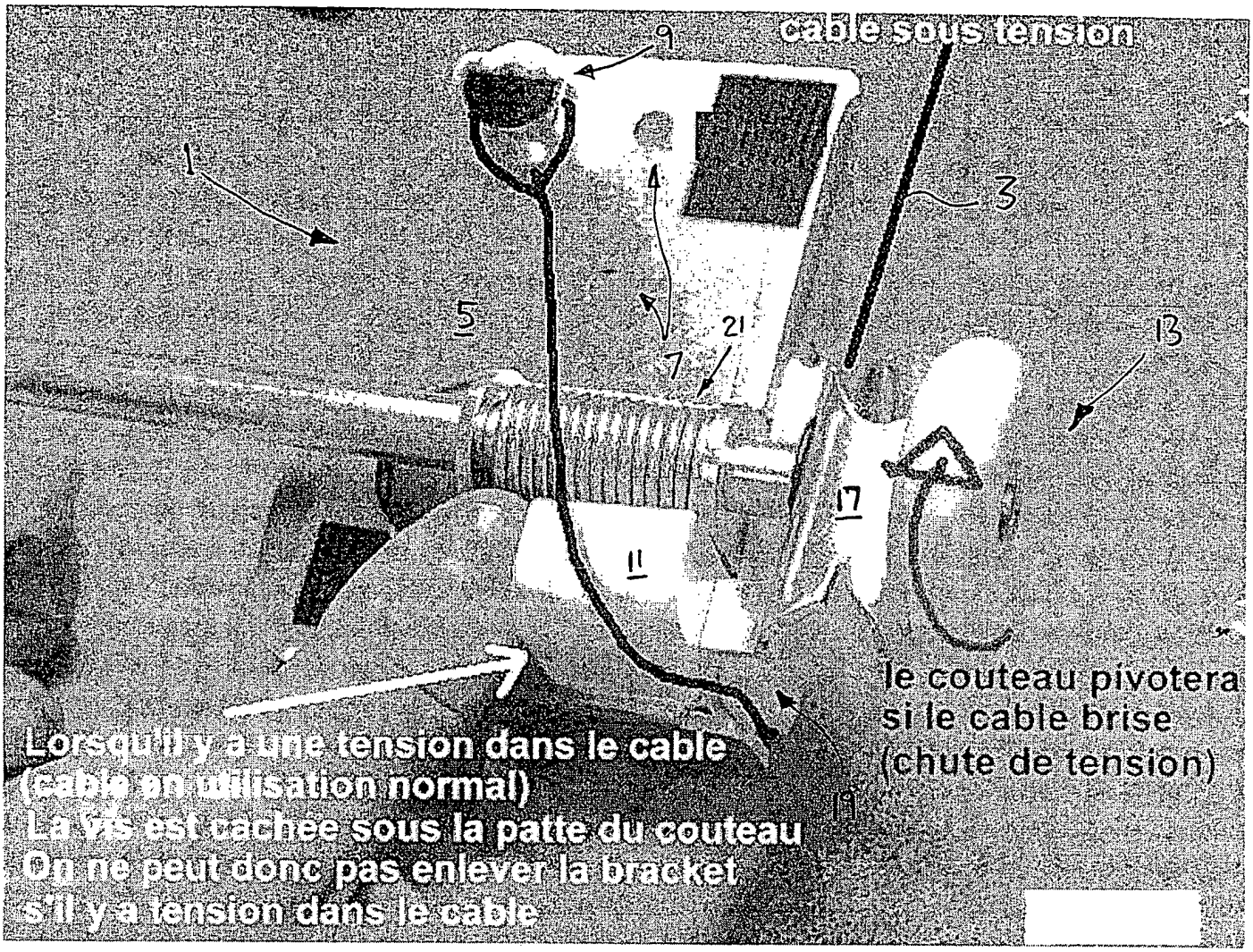

FIGURE 3

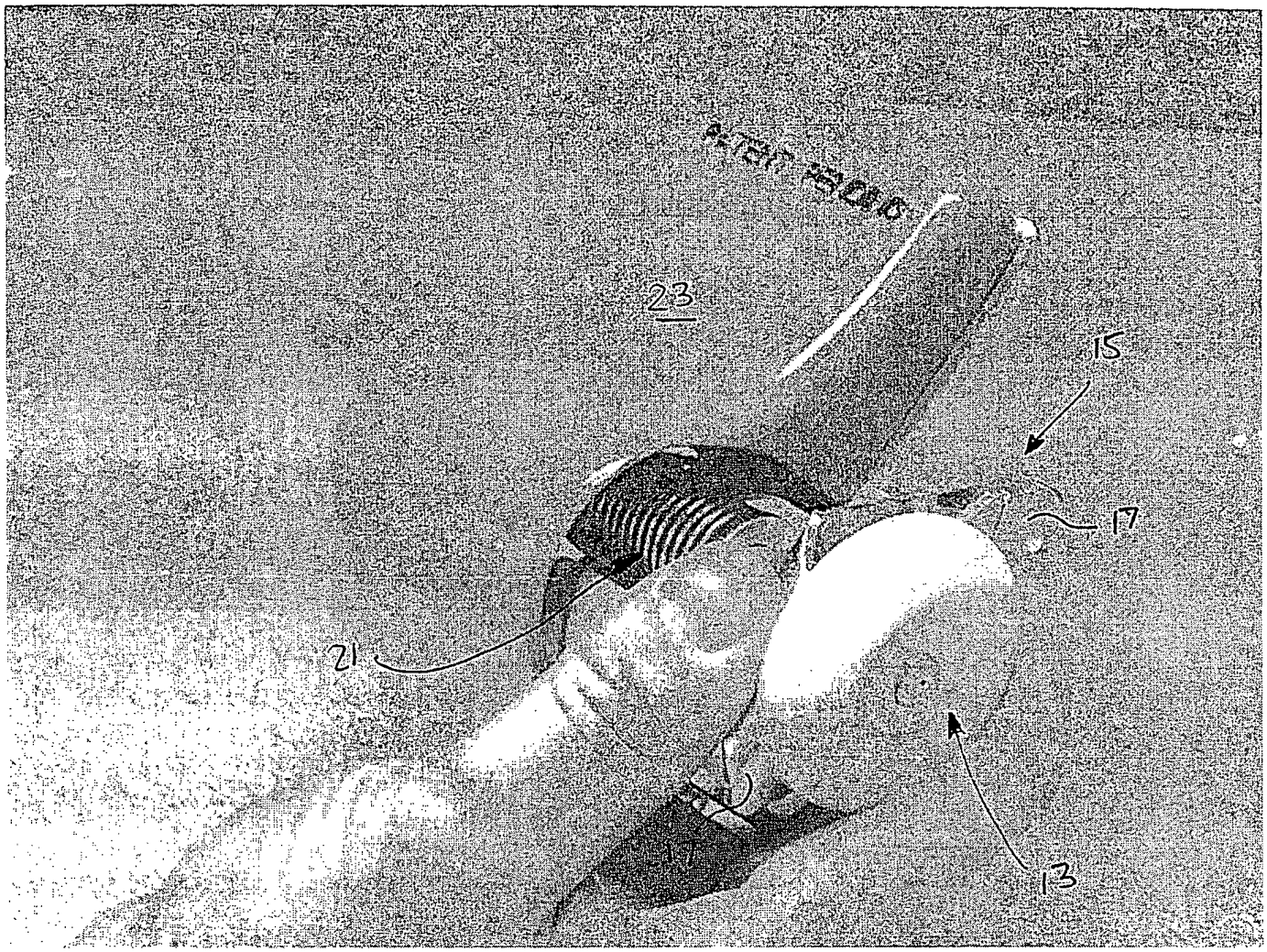

FIGURE 4

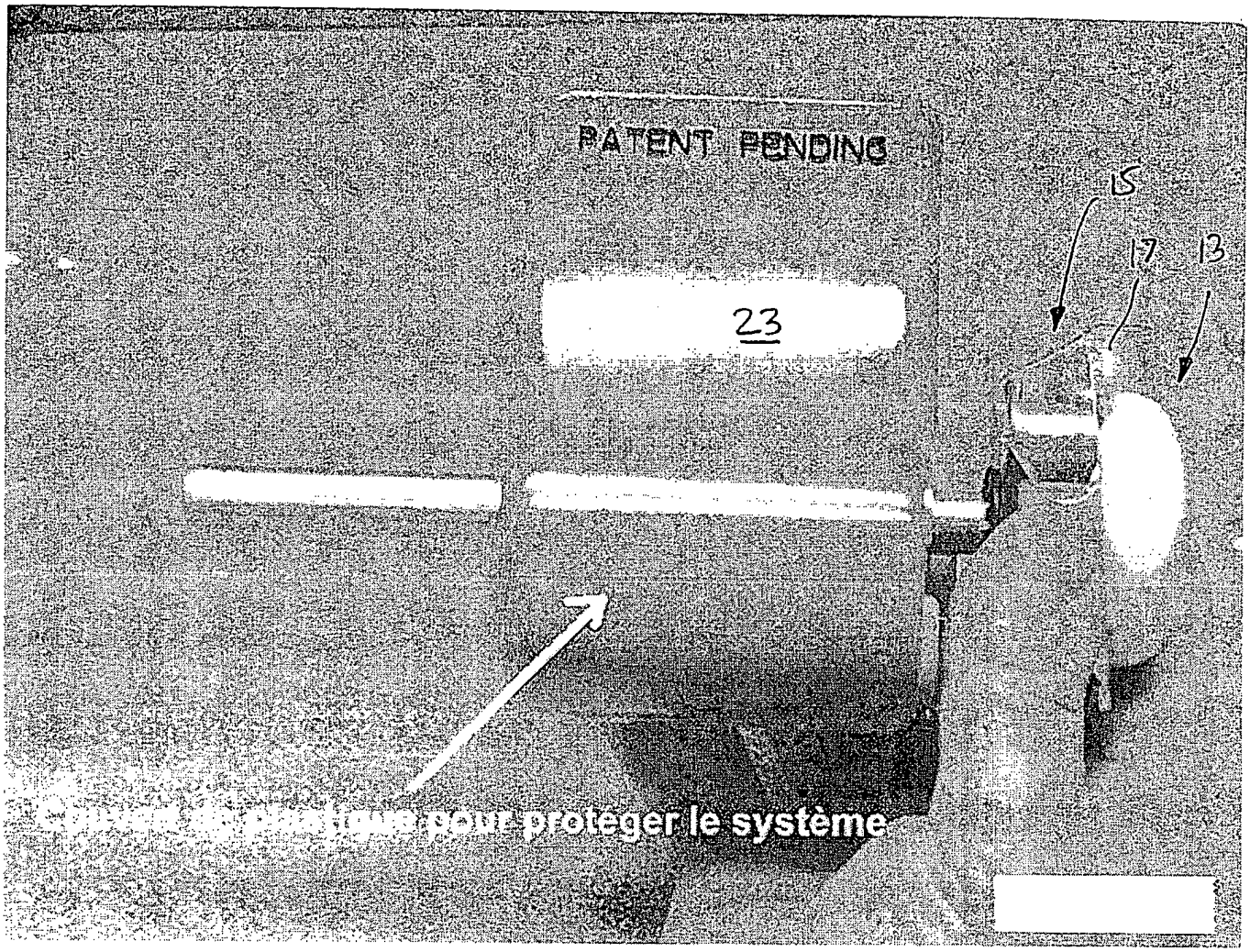

FIGURE 5